

COLLABORATIVE RESEARCH AND AUTHORSHIP PATTERN OF RESEARCH PAPER PUBLISHED ON JOURNAL OF THORACIC ONCOLOGY

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ABSTRACT

This study examined the collaborative research and authorship pattern of scientific publications of the Journal of Thoracic Oncology (JTO) during the selected ten years between 2006 and 2015. The data have been downloaded for the analysis of JTO from the Web of Science (WOS) citation database on 22 August 2016. Observations show that multi authored papers 12373 (89.10%) dominate single authored papers 1515 (10.90%). The highest number of research articles, i.e., 2567 (18.48%) was published in the year 2011. The degree of collaboration is determined as 0.89 and the doubling time is highest in the year 2014 with 11.55.

KEYWORDS: Authorship Pattern, Bibliometrics, Degree of Collaboration, Research Collaboration & Scientometrics

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INTRODUCTION

Journal of Thoracic Oncology (JTO), as a monthly publication and commonly they release two to three special issues every year. The first issue of volume 1 and issue 1 was published in January 2006 on behalf of Lippincott Williams & Wilkins Ltd. JTO the authorized Journal of the International Association for the Study of Lung Cancer (IASLC). In this study, examined the collaborative research and authorship pattern of scientific publications of the JTO during the selected ten years between 2006 and 2015.

REVIEW OF RELATED LITERATURE

A huge number of research papers have been done in the field of collaborative research and authorship pattern in the last few decades. For this study, we have chosen a few of them and exhibited here.

Biradar, (2016)² the study identifies the pattern of authorship and the collaboration in the field of economics (2000 – 2014). Senthilkumar, R and Muthukrishnan, M (2016)³ the paper analysis, authorship patterns and collaborative research of oncology research in India from 2005-2015. Velmurugan, (2015)⁴ this research article analysis the growth rate and collaborative research of articles published by Journal of Intellectual Property Rights (JIPR) during the period of 2007 to 2014. Amsaveni, (2013)⁵ the present paper attempts to study the authorship pattern and collaborative research in the research field of Bioinformatics. Barik, (2013)⁶ the present paper attempts to study the authorship pattern of sixty eight research articles of the journal of 'Trends in Information Management' published during the period of 2008 to 2012. Arya, (2012)⁷ Authorship pattern and collaborative research trends are studied in the field of veterinary medicine based on the data collected from 'Indian

Journal of Veterinary Medicine' published during the period of 1999 to 2007. Elango and Rajendran, (2012)⁸ this study briefly explain the authorship pattern and collaboration, analysis of Marine Sciences research papers, the data have been collected from the Indian Journal of Marine Sciences published from 2001 to 2010. C. R. Karisiddappa, (2009)⁹ the authorship pattern and collaborative research in psychology, based on the data collected from 'Psychological Abstracts' for the year 1988. Chang, (2009)¹⁰ this paper aims to identify the Asian authorship pattern of Journal of the Association for Information Science and Technology. Farahat, (2002)¹¹ this study examines patterns of authorship in nineteen Egyptian journals of agricultural science. Bird, (1997)¹² the present paper attempts to analysis the Aquatic Sciences and Fisheries Abstracts database to identify marine mammal science research papers published during the period of 1985-1993. Cunningham & Dillon, (1997)¹³ this paper examines the patterns of multiple authorship in five information systems journals. Rana, (1994)¹⁴ this study analyses, the authorship pattern and collaborative research performance of Indian wildlife and fisheries during the period 1980-1989. Norris, (1993)¹⁵ this study examined the authorship patterns in CJNR from 1970-1991. Satyanarayana, K (1989)¹⁶ the paper presents an analytical study of the multiple authorship in research articles in the biomedical sciences.

OBJECTIVES OF THE STUDY

The objectives of the study are briefly as follows:

To analysis the year wise research articles and authorship pattern of the journal.

To analysis the year wise single and multi-authored Papers.

To analysis the degree of collaboration of the journal.

To analysis the time series analysis of the journal.

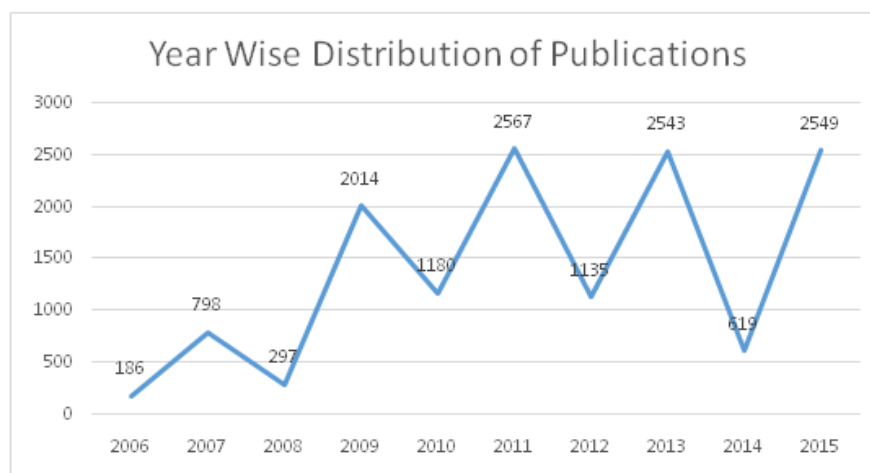
DATA ANALYSIS

JTO was selected as a source journal for this study, Issues from 10 volumes, i.e., 2006 to 2015. All essential data were downloaded from the "Thomson Reuters - Web of Science" database (WoS) and downloaded data were analyzed on different aspects, like analysis the research publications growth rate, doubling time of the research articles, analysis of authorship pattern of research articles, year wise degree of collaboration and time series analysis of the research articles. A total of 13888 records was downloaded for the period from 2006 to 2015 for 10 years.

Table 1: Year Wise Distribution of Publications

S No	Year	Total Papers	%	TLCS	%	TGCS	%
1	2006	186	1.34	316	8.0	3399	6.7
2	2007	798	5.75	678	17.3	7268	14.3
3	2008	297	2.14	510	13.0	6629	13.0
4	2009	2014	14.50	481	12.2	6292	12.4
5	2010	1180	8.50	579	14.7	7289	14.3
6	2011	2567	18.48	554	14.1	8562	16.8
7	2012	1135	8.17	309	8.0	5050	10.0
8	2013	2543	18.31	295	7.5	3412	6.7
9	2014	619	4.46	159	4.0	1926	3.8
10	2015	2549	18.35	49	1.2	1033	2.0
		13888	100.00	3930	100	50860	100

TLCS = Total Local Citation Score, *TGCS = Total Global Citation Score,



Graph 1: Year Wise Distribution of Publications

Here, an effort was made to analyze for the period of ten years from 2006-2015. Table 1 and Graph 1 present the year wise distribution of number of publications indexed in WoS database. The average number of article publication was 1389 articles per year. It is evident from the Table 1 that the journal has been published regularly with more papers on odd years. Table similarly shows that maximum articles 2567 (18.48 %) were published in 2011 with a highest global citation score of 8562, and minimum articles 186 (1.34 %) were published in 2006.

Relative Growth Rate (RGR)

The Relative Growth Rate (RGR) is one of the best analyzing methods for analysis bibliometrics data set in recent years. The RGR for each research article and pages can be analyzed individually.

$$R(a) = \frac{(W2 - W1)}{(T2 - T1)}$$

Whereas

R (a) = RGR from the particular time of period, W1= logarithm W1 (logarithm Value of opening number of research articles/pages), W2= logarithm W2 (logarithm values of the final number of research articles/pages), T2- T1 = Unit difference between the opening and end time.

Doubling Time (DT)

There is a direct comparison between the relative growth rate (RGR) and doubling time (DT) and the corresponding doubling time was analyzed using the following formula,

$$\text{Doubling Time (DT)} = \frac{(0.693)}{(RGR)}$$

Table 2: Relative Growth Rate (RGR) and Doubling Time (DT) of Publications

S No.	Year	No. of Records	%	Cumulative	W1	W2	RGR	DT
1	2006	186	1.339	186		5.22		
2	2007	798	5.746	984	5.22	6.89	1.67	0.41
3	2008	297	2.139	1281	6.89	7.15	0.26	2.67
4	2009	2014	14.5	3295	7.15	8.10	0.95	0.73
5	2010	1180	8.497	4475	8.10	8.40	0.30	2.31
6	2011	2567	18.48	7042	8.40	8.85	0.45	1.54
7	2012	1135	8.173	8177	8.85	9.00	0.15	4.62
8	2013	2543	18.31	10720	9.00	9.27	0.27	2.57
9	2014	619	4.457	11339	9.27	9.33	0.06	11.55
10	2015	2549	18.35	13888	9.33	9.53	0.20	3.47
	Total	13888	100	61387				

DT = Doubling Time

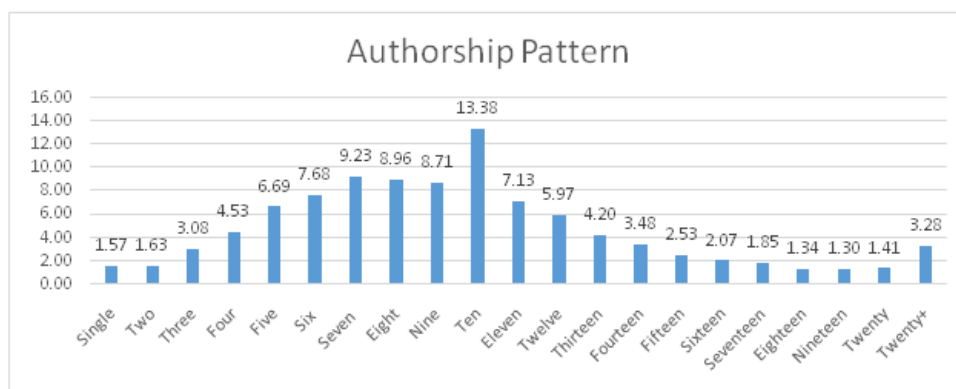
It has been observed from Table 2 and Graph 2, that its relative growth rates has decreased from 2007(1.67) to 2015 (0.2) in the 10 year period. The Doubling time increased from 0.41 in 2007 to 3.47 in 2015 and the doubling time is highest in the year 2014 with 11.55.

Authorship Patterns

The below table 3 reveals that a total of 96669 authors has contributed the 13888 articles and the average number of authors per article observed to be 6.7. Among 13888 articles, 1515(10.9%) articles are written by a single author and 12373 (89.1%) articles are written by multiple authors. Five and Ten authored articles involved highest percentage 1293 (9.31%), and six to Fifteen authored contributions are between 8 to 1 percent. Above fifteen authored contributions are below one percent of the articles.

Table 3: Presenting the Authorship Pattern

S No	No of Authors	No of Publications	%	Authorship Pattern	%
1	Single	1515	10.91	1515	1.57
2	Two	786	5.66	1572	1.63
3	Three	993	7.15	2979	3.08
4	Four	1094	7.88	4376	4.53
5	Five	1293	9.31	6465	6.69
6	Six	1238	8.91	7428	7.68
7	Seven	1274	9.17	8918	9.23
8	Eight	1083	7.80	8664	8.96
9	Nine	936	6.74	8424	8.71
10	Ten	1293	9.31	12930	13.38
11	Eleven	627	4.51	6897	7.13
12	Twelve	481	3.46	5772	5.97
13	Thirteen	312	2.25	4056	4.20
14	Fourteen	240	1.73	3360	3.48
15	Fifteen	163	1.17	2445	2.53
16	Sixteen	125	0.90	2000	2.07
17	Seventeen	105	0.76	1785	1.85
18	Eighteen	72	0.52	1296	1.34
19	Nineteen	66	0.48	1254	1.30
20	Twenty	68	0.49	1360	1.41
21	Twenty+	124	0.89	3173	3.28
	Total	13888	100	96669	100.00



Graph 2: Presenting the Authorship Pattern

Degree of Author's Collaboration

The formula created by K Subramanyam (1983) is a most useful formula for calculating the degree of collaboration. The mathematical formula is

$$C = \frac{(Nm)}{(Nm + Ns)}$$

Whereas,

C = Degree of collaboration, Nm = Number of multi-authored research papers

Ns = Number of single-authored research papers

Table 4: Degree of Collaboration

S No	Year	Sap(Ns)	%	Map(Nm)	%	Total (Nm+Ns)	Dc
1	2006-2015	1515	10.90	12373	89.10	13888	0.89

Here, Nm = 12373, Ns = 1515

$$C = \frac{12373}{12373 + 1515} = 0.89,$$

Thus, the degree of collaboration (C) is 0.89

The analysis of Table 4 shows that the degree of collaboration during the period of 10 years 2006-2015 is 0.89. The single authored articles are covered only 1515 (10.90%) during the years. The multi authored articles 12373 (89.10%) are maximum throughout the years. Which clearly displays its strength upon multi authored collaborative research. However, when we analysis the year-wise degree of collaboration for 10 years, the outcomes arise different.

Table 5: Year Wise Degree of Collaboration

S No	Year	Sap(Ns)	%	Map(Nm)	%	Total (Nm+Ns)	% Of Records	Dc
1	2006	20	1.32	166	1.34	186	1.34	0.89
2	2007	164	10.83	634	5.12	798	5.75	0.79
3	2008	24	1.58	273	2.21	297	2.14	0.92

Table 5: Contd.,								
4	2009	283	18.68	1731	13.99	2014	14.50	0.86
5	2010	140	9.24	1040	8.41	1180	8.50	0.88
6	2011	312	20.59	2255	18.23	2567	18.48	0.88
7	2012	97	6.40	1038	8.39	1135	8.17	0.91
8	2013	199	13.14	2344	18.94	2543	18.31	0.92
9	2014	35	2.31	584	4.72	619	4.46	0.94
10	2015	241	15.91	2308	18.65	2549	18.35	0.91
	Total	1515	100.00	12373	100.00	13888	100.00	0.89 (Mean)

SAP = Single Authored Paper, *MAP = Multi Authored Papers, *DC = Degree of Collaboration

The Table 5 expresses to the year wise number of multi authored research papers and their degree of collaboration. In this analysis, the degree of collaboration was not a constant value, it exposes varies from 0.79 to 0.94 percent and the mean quality as 0.89 which visibly indicates its dominance upon multiple authored contributions.

Time Series Analysis

Table 6: Time Series Analysis

S No	Year	Sap(Y)	X	X ²	Xy	Map(Y)	Xy	Cp(Y)	Xy
1	2006	20	-5	25	-100	166	-830	186	-930
2	2007	164	-4	16	-656	634	-2536	798	-3192
3	2008	24	-3	9	-72	273	-819	297	-891
4	2009	283	-2	4	-566	1731	-3462	2014	-4028
5	2010	140	-1	1	-140	1040	-1040	1180	-1180
6	2011	312	1	1	312	2255	2255	2567	2567
7	2012	97	2	4	194	1038	2076	1135	2270
8	2013	199	3	9	597	2344	7032	2543	7629
9	2014	35	4	16	140	584	2336	619	2476
10	2015	241	5	25	1205	2308	11540	2549	12745
	Total	1515	0	110	914	12373	16552	13888	17466

Single Authored Publications: Time Series Analysis

The straight line equation is applied to arrive at projections for future growth under Time Series analysis. The Straight Line equation $Y_c = a + bX$ since $\Sigma x = 0$, $a = \Sigma Y / N$, $\Sigma Y =$ (Total Number of Paper by Single Author), $N =$ (Number of Years), $a = 1515/10$, $a = 151.5$, $b = \Sigma XY / \Sigma$, $\Sigma XY =$ (Total of XY Tables), $\Sigma =$ (Total of X2 Table), $b = 914/110$, $b = 8.3$

Estimated literature in 2020 is, When $X = 2020 - 2011$ (Mid-Year), $X = 9$,

Apply Straight line equation, $Y_c = a + bX$ since $\Sigma x = 0$, $Y_c = 151.5 + 8.3 * 9$, $Y_c = 151.5 + 74.7$

$Y_c = 226.2$

Multi Authored Publications: Time Series Analysis

Straight Line equation $Y_c = a + bX$ since $\Sigma x = 0$, $a = \Sigma Y / N$, $\Sigma Y =$ (Total Number of Paper by Multi Author), $N =$ (Number of Years), $a = 12373/10$, $a = 1237.3$, $b = \Sigma XY / \Sigma$, $\Sigma XY =$ (Total of XY Tables), $\Sigma =$ (Total of X2 Table), $b = 16552/110$, $b = 150.5$.

Estimated literature in 2020 is, When $X = 2020 - 2011$ (Mid-Year) $X = 9$,

Apply Straight line equation, $Y_c = a + bX$ since $\Sigma x = 0$, $Y_c = 1237.3 + 150.5 * 9$, $Y_c = 1237.3 + 1354.5$,

$$Y_c = 2591.8$$

Collaborative Publications: Time Series Analysis

Straight Line equation $Y_c = a + bX$ since $\Sigma x = 0$, $a = \Sigma Y/N$, $\Sigma Y =$ (Total Number of Paper by Multi Author), $N =$ (Number of Years), $a = 13888/10$, $a = 1388.8$, $b = \Sigma XY/\Sigma$, $\Sigma XY =$ (Total of XY Tables), $\Sigma =$ (Total of X2 Table), $b = 17466/110$, $b = 158.78$.

Estimated literature in 2020 is, When $X = 2020 - 2011$ (Mid-Year) $X = 9$,

Apply Straight line equation, $Y_c = a + bX$ since $\Sigma x = 0$, $Y_c = 1388.8 + 158.78 \times 9$, $Y_c = 1388.8 + 1429.02$,

$$Y_c = 2817.82$$

On the application of the formula of Time Series Analysis for the expectation of JTO research output for the year 2020, it was found that the future trend and development in JTO research output may take an expanding trend in single authored publications ($Y_c = 226.2$) during the years to come and collaborative publications trends also increasing gradually ($Y_c = 2817.82$).

CONCLUSIONS

The findings of the study are summarized as follows

- The journal has been published regularly with more papers on odd years.
- The average number of article publication was 1389 articles per year.
- The multi authored papers 12373 (89.10%) dominate single authored papers 1515 (10.90%).
- The Doubling time increased from 0.41 in 2007 to 3.47 in 2015 and the doubling time is highest in the year 2014 with 11.55.
- The degree of collaboration during the period of 10 years 2006-2015 is 0.89.
- JTO research output may take an expanding trend in single authored publications $Y_c = 226.2$.

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